Chapter II
Alternatives Considered

The alternatives considered for the Proposed Action included the No-Build Alternative with Mass Transit and Intelligent Transportation Systems, the Preliminary Build Alternatives, and the Final Build Alternatives. Exhibit II-1 shows the Study Corridor that was used for the development of the alternatives.

A. No-Build Alternative

The No-Build Alternative represents the existing roadway system plus any committed or reasonably anticipated transportation improvements in the study area. The only forecasted improvements near the study area are expansion on the South Liberty Parkway arterial network and improvements to NE 76th Street.

Under the No-Build scenario, congestion would not be relieved at the M-152 interchange (at I-35) or at the Pleasant Valley interchange (I-35/US 69/Pleasant Valley Road/West Liberty Drive). In the design year 2030, the M-152 Interchange is forecasted to operate at a Level of Service F/E (NB/SB) and the Pleasant Valley interchange is forecasted to operate at a Level of Service D. Traveler safety is expected to continue to decline and traffic congestion is expected to increase, resulting in increased traveler costs. Economic opportunities in the study area may not develop or be fully enhanced under the No-Build alternative. In addition, students west of I-35 would not have pedestrian or bicycle access to the South Valley Schools. For these reasons, the No-Build Alternative would not meet the improvement needs in the study area as identified in the purpose and need. However, the No-Build Alternative does provide a basis of comparison for evaluating the impacts and benefits of the proposed action.

1. MASS TRANSIT AND INTELLIGENT TRANSPORTATION SYSTEMS

Other considerations in the No-Build Alternative include Mass Transit and Intelligent Transportation Systems.

Mass Transit, as provided by the Kansas City Area Transportation Authority (KCATA) and generally referred to as “The Metro,” operates local and express buses for destinations throughout the Kansas City metropolitan region. Most of these destinations are downtown Kansas City or specific employment centers. The only Metro bus route in the study area vicinity is the 69x Liberty Express, which travels along I-35. On this route, the nearest Metro stop is at M-152 Highway, which is approximately 1.75 miles northeast of the study area (via Flintlock Road).

Intelligent Transportation System (ITS) is represented by The Kansas City Scout, a traffic management system developed to serve the entire Kansas City metropolitan region. The Kansas City Scout operates on approximately 75 miles of the area’s most heavily traveled vehicular corridors and helps ease traffic congestion along the major routes it serves by providing timely and accurate traffic information (on overhead Changeable Message Signs) of use to both the commuter and highway traveler. Although the KC Scout system occurs on portions of Interstates 35, 470, 670, 70, highways 71 and 169, and Route 9 in Missouri, it does not extend into the vicinity of the study area.

While both Mass Transit and Intelligent Transportation Systems have their place in comprehensive transportation planning for the Kansas City metropolitan region, they are not considered alternatives that will satisfy the purpose and need for this project.

B. Build Alternatives

The Build Alternatives under consideration for the proposed action would overpass I-35 and provide a connection between Flintlock Road in Liberty and Flintlock Road at NE 76th Street in Kansas City, Missouri. These alternatives were analyzed based on project costs, design speeds, impacts to the Little Shoal Creek floodway, impacts to existing utilities, and anticipated traffic capacity.

1. DESIGN CRITERIA

a. Practical Design

In order to stay within the projected budget, the Missouri Department of Transportation's (MoDOT's) Practical Design method was utilized in the development of the Build Alternatives for this project. Simply stated, Practical Design challenges traditional standards rather than applying generic standards across the board. The intent is to develop the most efficient solution to solve the project's purpose and need, while considering the surrounding context of the project. The overall goal is to get the best value with the least cost, without compromising safety.

b. Proposed Design Criteria

Through the core team meeting discussions, the City of Kansas City and the City of Liberty approved the Practical Design modifications of standard design criteria. These included utilizing 11-foot wide lanes instead of a 12-foot width (acceptable because of slower speeds and low volumes of truck traffic), and utilizing a four-foot wide median. Median widths vary at intersections and where the proposed roadway meets existing roadways. Existing Flintlock Road in Kansas City was constructed with a 16-foot wide median north of NE 76th Street. Flintlock Road in Liberty is currently under construction and will have a 15-foot median. The resulting proposed design criterion for the Build Alternatives is shown in Table II-1 and a proposed typical section is shown in Exhibit II-2.

Table II-1: Proposed Design Criteria

Roadway	Const. ADT FY 2010	Design ADT FY 2030	Design Speed	No. & Width of Lanes	Median Width	Roadbed Width	Right-of-Way (Min.)	
							Width	Control
Flintlock	7,500	36,000	40 mph	Four 11' lanes	0-15'	52-69'	80'	Limited

2. PRELIMINARY BUILD ALTERNATIVES

At the beginning of the planning process, preliminary build alternatives were developed and analyzed. These preliminary alternatives were not carried forward as final build alternatives for the reasons discussed below for each alternative.

a. City's Conceptual Alignment

A conceptual alignment (see Exhibit II-3) was developed by the City of Liberty as part of the City's Transportation Plan before the construction of the South Valley Middle and Junior High Schools, and would have had a large impact on the school's facilities. This alignment would have also impacted an existing triple box culvert under I-35, a sanitary sewer lift station, transmission line supports, and encroached on the Little Shoal Creek Floodway. Based on these findings, this alignment was discarded.

b. 50 mph Alternative

Because the City of Liberty design criteria ties functional classification to traffic volumes, an initial alternative based on a 50 mph design speed was considered. This alternative (see Exhibit II-4) would have had substantial encroachment into the floodway north and south of I-35, impacts to the sanitary sewer and lift station, impacts to an existing triple box culvert under I-35, and considerable bridge costs. Fifty (50) mph was not consistent with the design speeds along the existing Flintlock Roads in Kansas City and in Liberty; therefore this alternative was also discarded.

c. Initial 40 mph Alternative

A 40 mph design speed alternative was developed and scrutinized for impacts to natural and man-made features. As design and construction year traffic was forecasted and studied along the proposed corridor, a four-lane facility was found to meet a minimum level of service with the estimated future traffic volumes. For added driver safety, a raised median was proposed to divide oncoming traffic. An initial 40 mph alignment was developed that would avoid relocation of a large structural support for transmission lines that cross the proposed roadway (see Exhibit II-5). This alignment would not impact the existing triple box culvert under I-35, but would impact the triple box culvert under Stewart Road. A retaining wall would be needed to avoid the sanitary sewer lift station west of I-35. Furthermore, this alignment would extensively impact Little Shoal Creek and its floodway. This alternative was discarded because of the floodway impacts, significant bridge costs associated with spanning the floodway, and the retaining wall and box culvert costs.

3. FINAL BUILD ALTERNATIVES *(Floodway Avoidance)*

To minimize bridge construction and impacts to Little Shoal Creek, refined build alternative alignments were developed, based on a 40 mph design speed, in an attempt to avoid the floodway.

a. Build Alternative A *(Traditional Intersections at NE 76th Street and Liberty Drive)*

This alignment is based on a 40 mph design speed and would avoid the Little Shoal Creek floodway as much as practically possible. North of the South Valley Schools, reverse horizontal curves would balance impacts to the floodway with impacts to a perpendicular approach to NE 76th Street (see Exhibit II-6). Preferably, intersecting streets should meet at right angles with tangent approaches. As the angle between intersecting roadways decreases, construction costs increase and safety decreases. An acceptable angle range between intersecting roadways is between 60 to 90 degrees. In this location, an alignment perpendicular to NE 76th Street would appreciably impact Little Shoal Creek and a triple box culvert under I-35. To minimize impacts to these features and reduce construction costs, this alternative would intersect NE 76th Street with a horizontal curve and at an angle greater than 60 degrees. For added driver safety, a three-legged intersection is recommended. With this configuration, a connector road would provide access from NE 76th Street east of Flintlock Road under a stop condition.

b. Build Alternative B *(Roundabout at NE 76th Street*)

This alignment is based on a 40 mph design speed and would avoid the Little Shoal Creek floodway as much as practically possible. With this alternative, the intersection approach at NE 76th Street is skewed such that only a roundabout intersection is being considered (see Exhibit II-7). The roundabout at NE 76th Street would reduce traveler delays, provide shorter queues, and enhance safety at the intersection with a design year Level of Service, B. West of Flintlock Road, the roundabout leg to NE 76th would connect to recent NE 76th Street widening

improvements and would include a replacement of the existing bridge on NE 76th Street. NE 76th Street east of Flintlock Road would be realigned and connect into Flintlock Road south of the roundabout. The realigned NE 76th Street at Flintlock Road would be a stop condition.

c. Build Alternative C *(Roundabouts at NE 76th Street and Liberty Drive)*

This alignment would have the same geometric configuration as Build Alternative B, but replaces a traditional intersection at Liberty Drive with a roundabout, which will improve the LOS in comparison to a traditional intersection (see Exhibit II-8).

C. Construction Cost Estimates

A construction cost estimate was determined from the Proposed Typical Section shown in Exhibit II-2. The roadway was assumed to have two inches of asphaltic concrete surface course, ten inches of asphaltic concrete base, and twelve inches of fly ash treated subgrade. This estimate also includes a ten-foot multi-purpose trail along the east side of Flintlock Road. The major bridge structure is a fly-over bridge over I-35 and is proposed to be an 11 span, two unit structure with continuous pre-stressed concrete I-girders on concrete multiple column bents. The Little Shoal Creek Bridge to the south in Liberty is proposed to be a three span structure with continuous pre-stressed concrete I-girders. The Little Shoal Creek Bridge to the north in Kansas City, Missouri was also proposed to be a three span concrete structure. Additional bridge data is included in the Flintlock Overpass Over I-35 Bridge Report, which is available upon request.

Based on current MoDOT, Liberty, and Kansas City bid tabulations, construction cost estimates were prepared for the No-Build Alternative and three Final Build Alternatives. As shown in Table II-2, construction quantities were developed for the following primary categories: grading and drainage, pavement, bridges, miscellaneous items, utility relocation, and right-of-way acquisition. A twenty percent contingency was used to account for unforeseen circumstances. Engineering, program management and administration costs are not included in this estimate. The two roundabout alternatives assume that additional NE 76th Street improvements will be necessary. In contrast, the traditional intersection alternative does not include improvements to NE 76th Street.

Table II-2: Cost Estimate of Alternatives

Item	Cost Estimate in 2008 Dollars ($ million)			
	No-Build	**Alternative A (Traditional Intersections)**	**Alternative B (NE 76th St. Roundabout)**	**Alternative C (Two Roundabouts)**
Grading & Drainage	$0	$3.1	$3.0	$3.4
Pavement	0	2.0	2.3	2.0
Bridges	0	9.9	11.3	11.5
Misc. Items	0	0.9	0.6	0.6
Contingency (20%)	0	3.0	3.4	3.5
Subtotal	**$0**	**$18.9**	***$20.6**	***$21.0**
Utility Relocation	$0	$0.29	$0.29	$0.29
Right-of-Way Acquisition	0	2.84	2.84	2.84
TOTAL	**$0**	**$22.0**	***$23.7**	***$24.1**

* Includes necessary improvements to NE 76th Street.

D. Traffic Circulation

Traffic analysis of the Flintlock Overpass was performed for 2005 existing, 2010 construction and 2030 design years for the PM peak hour conditions. A comprehensive traffic analysis is included in the Flintlock Overpass Over I-35, Traffic Analysis Technical Report, and is available upon request.

The Flintlock Overpass is expected to carry 7,500 daily vehicles in the 2010 construction year and 36,000 daily vehicles in 2030. Approximately three to five percent of the traffic is anticipated to be heavy vehicles. The Flintlock Overpass is a new connection over I-35 between the two existing interchanges of M-152 and Pleasant Valley. A new crossing of I-35 provides improved circulation in the area. Vehicle trips not destined to/from I-35 are not required to use the existing I-35 Interchanges. This improves traffic circulation for all motorists in the study area, even those who will not use the Flintlock Overpass. Forecasted traffic at the two I-35 study interchanges is shown in Table II-3.

Table II-3: Forecasted Two-Way Peak Hour Volume

Location	2030 No-Build (PM Peak)	2010 Construction (PM Peak)	2030 Build (PM Peak)
Flintlock Overpass	--	750	3,600
M-152 East of I-35 Interchange	8,087	4,914	7,504
M-152 West of I-35 Interchange	6,952	2,852	6,272
South Liberty Parkway east of Pleasant Valley Interchange (I-35/US 69/Pleasant Valley Road)	6,228	887	4,711
Pleasant Valley Road west of Pleasant Valley Interchange	3,772	1,592	2,152

Source: Liberty Travel Demand Model

Based on the current and forecasted traffic demand, operations in the study area were assessed by utilizing the Level of Service (LOS) scale as outlined in the Highway Capacity Manual. Table II-4 provides a summary of the LOS results in the study area.

Table II-4: Current and Forecasted LOS

Year	M-152 Interchange[1]	Pleasant Valley Interchange	Flintlock Rd. & Liberty Drive	Flintlock Road & NE 76th Street
2005 (Existing)	D/D	C	-	-
2030 No-Build	F/E	D	-	-
2010 Construction	D/C	B	A	A
2030 Design Year	D/D	B	B	B

[1] NB / SB ramps

Level of Service A through D is considered acceptable. Level of Service E or F is considered unacceptable. Based on the identified roadway improvements in the study area and the Flintlock Overpass, LOS will improve at the study intersections as a result of traffic shifting from the two I-35 Interchanges to Flintlock Road for east/west travel across I-35.

E. Alternatives Analysis

1. EVALUATION

The Evaluation Matrix, shown in Table II-5, details comparisons of the No-Build and Build Alternatives. Key points of comparison include:

- All of the Build Alternatives meet the Purpose and Need.
- Build Alternative A with Traditional Intersections would be approximately two million dollars less than the roundabout alternatives (B and C).
- Build Alternative C (with two roundabouts) would provide the greatest Level of Service at all of the proposed intersections.
- Build Alternative C (with two roundabouts) would provide the greatest potential crash reduction.

Table II-5: Flintlock Road Evaluation Matrix

Evaluation Factors	No-Build	Build Alternatives		
		Alternative A (Traditional Intersections)	Alternative B (NE 76th St. Roundabout)	Alternative C** (Two Roundabouts)
Engineering Issues				
Does the alternative meet the Purpose and Need?	No	Yes	Yes	Yes
Does the alternative meet design criteria?	N/A	Yes	Yes	Yes
Is the alternative able to be constructed?	N/A	Yes	Yes	Yes
Project construction costs (2008 dollars)	$0	$18.9 mill	$20.6 mill*	$21.0 mill*
Traffic/Safety Issues (2030 Design Year)				
ADT Forecasted Traffic Demand	N/A	36,000	36,000	36,000
LOS for Liberty Drive/Flintlock Intersection	N/A	D	D	B
LOS for 76th Street/Flintlock Intersection	B	D	B	B
LOS for Pleasant Valley Interchange (I-35/US69/Pleasant Valley Road)	D	B	B	B
LOS for M-152/I-35 Interchange (NB/SB)	F/E	D/D	D/D	D/D
PM Peak Traffic Impacts for M-152/I-35 Interchange	Base	-650	-650	-650
PM Peak Traffic Impacts Pleasant Valley Interchange	Base	-1500	-1500	-1500
Crash Impacts at M-152/I-35 Interchange***	-	+	+	+
Crash Impacts at Pleasant Valley Interchange (I-35/US 69/Pleasant Valley Road)***	-	+	+	+
Crash Impacts at Liberty Drive & Flintlock***	N/A	-	-	+
Crash Impacts at NE 76th Street & Flintlock***	N/A	-	+	+
Pedestrian Route over I-35	No	Yes	Yes	Yes

Table II-5: Flintlock Road Evaluation Matrix (continued)

Evaluation Factors	No-Build	Build Alternatives		
		Alternative A (Traditional Intersections)	Alternative B (NE 76th St. Roundabout)	Alternative C** (Two Roundabouts)
Environmental Issues				
Farmland Impacts (acres)	0	0	0	0
Parkland Impacts – 4(f)	0	0	0	0
Stream Impacts (linear feet filled)	0	1003 lf	1063 lf	1063 lf
Wetland Impacts (acres)	0	0	0	0
Floodplain Impacts (encroachment - acres)	0	3.73 ac	4.00 ac	4.01 ac
Forest Impacts (acres)	0	9.80	10.39	10.87
High Quality Natural Community Impacts	0	0	0	0
Threatened or Endangered Species Impacts	0	0	0	0
NRHP Eligible Architectural Resources Impacted	0	0	0	0
NRHP Eligible Archaeological Sites Impacted	0	0	0	0
Hazardous Wastes Sites Impacts	0	0	0	0
Visually Sensitive Area Impacts	0	1	1	1
Social and Economic Issues				
Residential Impacts (Total Acquisition)	0	0	0	0
Residential Impacts (Partial Acquisition)	0	5	7	7
Business Impacts (Total Acquisition)	0	0	0	0
Business Impacts (Partial Acquisition)	0	2	2	2
Public/Semi-Public Impacts (Total Acquisition)	0	0	0	0
Public/Semi-Public Impacts (Partial Acquisition)	0	2	2	2
Undeveloped Property Impacts (Total Acquisition)	0	0	0	0
Undeveloped Property Impacts (Partial Acquisition)	0	2	4	4
Minority or Low-income Community Impacts	0	0	0	0
Noise Receptors Impacted (Exceedance of NAC noise levels)	0	0	0	0

* Includes necessary improvements to NE 76th St.
** Proposed Action
*** - Negative Impact (crash rate remains the same or increases); + Positive Impact (crash rate decreases)

2. CONCLUSIONS

As discussed in the beginning of this chapter, the No-Build Alternative would not meet the improvement needs in the study area as identified in the Purpose and Need.

Build Alternative A (traditional intersections) would satisfy the purpose and need of the project, but would provide an inferior Level of Service at the Liberty Drive and NE 76th Street intersections. Traffic models indicate that the use of roundabouts on a four-lane facility would be the optimal solution to handle the estimated traffic volumes. Build Alternatives B and C (the roundabout alternatives) are estimated to be a higher cost, but would also encompass additional work on NE 76th Street and provide a higher benefit than the traditional intersection alternative.

It should be noted that the approximate two million dollar difference in cost between Alternative A and Alternatives B and C is primarily due to the replacement of the bridge on NE 76th Street west of Flintlock. Because of the geometry required for a roundabout at Flintlock and NE 76th Street, the existing bridge would have to be replaced under Alternatives B and C. This bridge is currently listed on the City of Kansas City, Missouri's Capital Improvements Program to be replaced at an estimated cost of 1.2 million dollars. If this future cost were factored into Alternative A, the cost difference between Alternative A and Alternatives B and C would become negligible.

a. **Proposed Action** (Recommended Preferred Alternative)

The projected Flintlock Road Average Daily Traffic (ADT) for the design year is approaching the capacity for a four-lane facility. Roundabouts would give the proposed facility a higher average vehicle capacity per lane, potentially extending the life of the corridor. After evaluating traffic, safety, public input, and environmental issues, Alternative C, the 40 mph floodway avoidance alignment with roundabouts at NE 76th Street and at Liberty Drive (see Exhibit II-8), was identified as the Proposed Action (recommended Preferred Alternative), as it would provide the most benefit at an additional, but reasonable cost. The Preferred Alternative will be selected after consideration of comments received at the public hearing and from other public agencies, and will be documented in the final Environmental Assessment.

b. Project Phasing

Due to the limited funding available for construction, the Proposed Action will need to be built in an interim phase and a final phase. The interim phase will consist of all of the grading, right-of-way, and utility relocation required for the four-lane Proposed Action, but construction will include only a two-lane roadway and two-lane bridges to carry traffic. This will set the ultimate footprint for the Proposed Action and will not require any substantial disturbance when the final phase is completed. The interim phase will also include an enclosed storm sewer system, lighting, and the multi-use pedestrian trail. The final phase will occur as traffic demands warrant, and will consist of widening the two-lane roadway and bridges to four lanes. Based upon the traffic analysis, this is not anticipated for the next 15-20 years.